Zero Retries issue 0126 2023-11-24

Zero Retries is an independent newsletter promoting technological innovation in Amateur Radio, and Amateur Radio as (literally) a license to experiment with and learn about radio technology. Now in its third year of publication, with 1000+ subscribers.

About Zero Retries

Steve Stroh N8GNJ, Editor

Jack Stroh, Late Night Assistant Editor Emeritus

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Web version of this issue - https://www.zeroretries.org/p/zero-retries-0126

Request To Send

Commentary by Editor Steve Stroh N8GNJ

Black Friday

Here in the US, this issue is being published on "Black Friday", when merchants offer (sometimes significant) discounts for the day or a weekend to generate increased sales volume. The only such sale that both crossed my threshold of notice and was Zero Retries Interesting was from Crowd Supply:

> KrakenSDR with Aluminum Case
>
> This fully assembled and tested KrakenSDR comes installed in a custom aluminum enclosure and includes a free copy of the KrakenSDR Android app.
>
> Regular Price: $498 - 15% off for Black Friday Sale
>
> $424 with $8 US Shipping / $18 Worldwide

The KrakenSDR is a Zero Retries Interesting unit, incorporating five software defined receivers connected to a common (coherent) timebase allowing time-of-arrival calculations to the various receiver inputs / antennas. With this, you can triangulate the direction of a received signal with no moving parts. My interest in the KrakenSDR is simply that it's a single unit with five receivers, each of which are capable of receiving the Amateur Radio VHF / UHF bands (24 MHz to 1766 MHz) thus with the one unit you can monitor five of the six (US) Amateur Radio VHF / UHF bands. If I was flush with cash and caught up on my many other Amateur Radio projects 🤣, the price cut would be tempting. I'm impressed enough with the KrakenSDR (or eventual equivalent) that it's on my list to acquire, but not today (despite the nice discount).

Major Shack Tidying This Week

In preparation for a special photograph (more about that next issue), I spent a lot of time this past week digging out my shack desk from an accumulation of potential projects and projects-in-progress and a *huge* number of "gotta put-it-aways". It was so much fun seeing the shack back in usable condition, and it was actually energizing to be able to walk up to the shack desk, sit down, and operate, and feel like I could actually tackle some projects for a change.

73,

Steve N8GNJ

Leave a comment

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Followup on *Next* Up… (FCC 23-93)

By Steve Stroh N8GNJ

In **Zero Retries 0125**, I wrote - ***Next* Up - Removing Symbol Rate Limitations on the US Amateur Radio VHF and UHF Bands; the FCC Requests Comments**

Unfortunately, I don't yet have advice (have not done my homework) on submitting comments to the FCC's Further Notice of Proposed Rulemaking for FCC 23-93.

But I did receive some interesting feedback that I'd like to share.

Change 420 - 450 MHz Bandwidth to *1.4 MHz* (Minimum)

Regarding my statement:

Recommendation for the 420-450 MHz (70 centimeter) band:

> Minimum proposal - 1 MHz: Replace the current Maximum Bandwidth of 100 kHz with a Maximum Bandwidth of 1 MHz.

Zero Retries reader Jann Traschewski DG8NGN suggested:

> I propose to suggest 1.4 MHz as a maximum bandwidth limit rather than 1 MHz. In 1.4 MHz a standard LTE channel would fit in. There are free implementations.
>
> You also might want to have a look at https://www.quantulum.co.uk/blog/private-lte-with-analog-adalm-pluto/ to find a cheap solution for the lab.
>
> For a real world solution, we need to change the frequencies in software and amplify the signal in hardware ;) In Europe, the total bandwidth in the 70 cm band is limited to 10 MHz (in some countries even less). So we could try 23-cm for the downlink and 70-cm for the uplink (1.4 MHz channels each).
>
> I would like to see a simplex version (TDD). Unfortunately, srsRAN only supports TDD on the user side (srsUE). srsENB lacks the TDD feature:
>
> https://docs.srsran.com/projects/4g/en/latest/feature_list.html
>
> Maybe an ARDC grant for srs (https://srs.io/) can help to close the gap? :)

(Like me, DG8NGN is a former volunteer with ARDC, so we're both familiar with the ARDC grant process.)

Besides the projects mentioned by DG8NGN, there is also Open LTE.

LTE (Long Term Evolution) (also sometimes called "4G") is the mobile telephone standard currently in use (immediately prior to "5G" which, in my opinion, is not, yet, in widespread *actual* use).

The idea of Amateur Radio experimentation with LTE technology would definitely be of societal benefit, similar to how Amateur Radio has been able to develop enhancements to Wi-Fi technology, such as AREDN.

Thus, point taken, with thanks to DG8NGN, my comment to the FCC will reflect, at minimum, at minimum, a bandwidth limit of *1.4 MHz*, if not 6 MHz, or none at all.

While We Have the FCC's Attention, *Request Other Changes*? (No!)

One change that was suggested by a Zero Retries reader was revision of the prohibition against encryption1 so that Amateur Radio operators and systems providing emergency communications *could provide encryption* of sensitive data on behalf of served agencies (such as health data on behalf of hospitals).

Another Zero Retries reader suggested updating various "rough spots" in the FCC regulations.

I understand that it's tempting to suggest other changes to the FCC Amateur Radio regulations "while we have the FCC's attention", in my opinion, *now is not the time to do so*, for two reasons.

1. The FCC is specifically asking only for comments on removing Symbol Rate limitations and potentially changing bandwidth limits. That's all they want to hear about. Comments on any other issue will be ignored, and risks Amateur Radio comments not being taken seriously.

2. These potential changes can be so beneficial to US Amateur Radio that it would be a shame to jeopardize those beneficial changes by giving the FCC a reason not to act on those potential changes.

Regarding encryption, I've been told that there is some… interest… in suggesting to the FCC that the current ban on encryption should perhaps be revisited given the technology of the 2020s and beyond such as HTTPS now the default mode of most websites that are accessed from an interconnection via Amateur Radio. *That is a discussion worth having* with the FCC *in the near future*, as is other modernizing revisions such as Bruce Perens K6BP's excellent suggestions to the FCC in 2017.

Let's not blow this fantastic opportunity to modernize data communications technology for the US Amateur Radio VHF / UHF bands.

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Amateur Radio GEO Possibilities from the AMSAT-UK 2023 Colloquium

By Steve Stroh N8GNJ

There are at least a few potential, promising solutions for an Amateur Radio payload, or even

satellite, at Geosynchronous Earth Orbit (GEO).

In **Zero Retries 0124**, I wrote AMSAT-UK Figures Out GEO Payload?

> On the Convention schedule, Lecture Room 5 - AMSAT had two intriguing-sounding talks:
>
> 9.45 - 10.15 - Frank Zeppenfeldt PD0AP - **Geostationary Microwave Amateur Payload Proposal**
>
> 15.15 - 15.30 - Karl Kaas OZ2KK - **Space Inventor A/S First CubeSat to GEO**
>
> Both titles hinted of an Amateur Radio payload or satellite into Geosynchronous / Geostationary Earth Orbit - GEO.
>
> But I could not find any further information on either of these talks - no recordings, no papers, etc. It would certainly be interesting to know more about what PD0AP and OZ2KK discussed / discovered / developed for getting another Amateur Radio satellite or payload into GEO.

My Thanks to loic_fejoz - @loic_fejoz@mastodon.gougere.fr on Mastodon for directing me to the videos of those talks.

Geostationary Microwave Amateur Payload Proposal - Frank Zeppenfeldt PD0AP - This is an interesting, promising proposal of the European Space Agency (ESA) for a future satellite payload that would place another Amateur Radio payload in Geostationary or Geosynchronous Earth Orbit (GEO) to benefit primarily European Amateur Radio Operators. This is a funded investigation to develop the parameters for a potential project and they are, or soon will be soliciting comments from Amateur Radio Operators and Amateur Radio organizations. Interestingly, because Canada is a member of ESA, it's a goal of ESA to provide coverage to Canadian Amateur Radio Operators. Perhaps us American Amateur Radio Operators would also benefit? Being located 20 miles South of the US / Canada border, I'm pretty sure I'll be within the footprint.

First CubeSat to GEO - Ivelin Penchev - Space Inventor is a commercial satellite builder that claims to have successfully placed a "16 U" cubesat into GEO for a commercial customer. What's most interesting to me was that the launch vehicle didn't deliver this satellite to GEO, but rather 1000 kM below GEO, and the satellite was navigated to GEO on its own power, using electric thrusters.

I looked at Space Inventor's Product Catalogue, and I (and I think most folks) get the impression that Space Inventor would be more than capable of building and launching a cubesat for Amateur Radio use. Or, perhaps creating a cubesat that could be shared with a compatible partner organization.

Add to that the potential of the Arcturus satellite by Astranis (previously discussed in **Zero Retries 0103** - Moonshot 2 - Western Hemisphere GEO Satellite / Payload) , which is headquartered in San Francisco, California, USA (with lots of open jobs).

With demonstrated capabilities like this for GEO satellites / payloads seemingly appropriate / compatible with Amateur Radio, *I remain baffled why US / North America Amateur Radio Operators and organizations (AMSAT-NA) isn't actively discussing GEO!* For example, one of the first issues to be resolved if someone / some organization (perhaps funded by a generous tech billionaire with a Zero Retries Interesting mindset) were to commission Space Inventor to build an Amateur Radio GEO satellite would be:

How, *exactly*, does *Amateur Radio* go about obtaining a GEO orbital slot to cover the Western Hemisphere?

You don't start that research a few months before launch. In fact, you won't even get to talk to a launch provider about a launch commitment until you have that very formally arranged.

(To be clear, I don't know the mechanics of this, but there has to be a lot of process, with significant legalities to arrange.)

I think Amateur Radio has been under the assumption that GEO is *so* challenging, *so* expensive, that being a payload on someone else's GEO satellite is the only way Amateur Radio at GEO is possible, such as QO-100. Thus "Amateur Radio didn't have to think about arranging a GEO orbital slot". Space Inventor's capabilities are reason to rethink that assumption.

Just one example of how to think a bit outside the box, every satellite operator wants a prime orbital slot so that one satellite / payload / antenna can cover all / most of (profitable) North America (illustration). But what if a GEO orbital slot that doesn't cover all of North America was easy and "cheap" to arrange? Such as an orbital slot that would cover much of North America (such as the Western, or Eastern US) but not all? Maybe try for two such satellites / orbits with a special gateway earth station that could easily and efficiently relay data between the two satellites?

As part of some background conversations about this topic, I've been told that there actually is interest in GEO within AMSAT-NA leadership, to which I replied:

> From my observations, there doesn't seem to be any current interest in GEO by AMSAT-NA. I think that public silence is damaging. Our fellow hams in the Eastern Hemisphere continually celebrate the capabilities of QO-100 (and resulting rise of interest in microwave), and AMSAT-NA looks lesser by comparison for not even talking about GEO.

I suspect that there's some "chicken and egg" posturing going on within AMSAT-NA. *Without funding lined up, what's the point of doing the research?*
vs
If you did get a lucky break and got in front of someone who could fund an Amateur Radio GEO satellite or payload for the Western Hemisphere, what would you say?

At the moment, it seems like the conversation would go something like this:

AR: "We'd like to put up an Amateur Radio satellite or payload for the Western Hemisphere."
Potential Funder: "OK, tell me more - cost, capabilities, schedule?"

AR: “Um, can I get back to you?”
Potential Funder: “Oh, you weren’t *serious*.”

I think that with this new potential - the ESA project, Space Inventor, and potentially Astranis, I think it’s time North American Amateur Radio Operators to “Get Serious” about GEO. If you’re a member of AMSAT-NA, I think it’s time to provide feedback to the AMSAT-NA leadership to that effect.

For example, given ESA’s focus on their potential Amateur Radio GEO project to specifically address *Canadian* Amateur Radio satellite operators, I’d sign up to be a supporting member of a new **AMSAT-CA** in a heartbeat. Just sayin’.

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ZR > BEACON

By Steve Stroh N8GNJ

Short mentions of Zero Retries Interesting items.

New Starlink User Terminal

Image courtesy of Starlink

Starlink recently introduced an additional model of user terminal “Standard” that does not include the azimuth and elevation motors (now called “Standard Actuated”), and is thus more streamlined. It includes a kickstand for slight inclination towards the sky. Instead of motors to self-orient, it uses a human, guided by the Starlink app to optimize the orientation (if needed). This version is enabled by high density of Starlink satellites now available in almost any orientation, including completely horizontal, such as on the roof of a vehicle. Interestingly, as I write this, there’s no difference in cost between the previous (motors included) unit and the “kickstand” unit. The Standard user terminal ships with the Gen3 Router (and power supply), which has integrated Ethernet ports.

Info on Microwave Antenna Parameters Solicited by AREDN Developers

From an AREDN mailing list that I follow by AREDN Ambassador (and Zero Retries Pseudostaffer) Orv Beach W6BI:

> The AREDN devs as part of the next nightly build are incorporating configurable antenna azimuth information into the code. But that's not especially helpful if you don't know the beamwidth and gain. So that information will be incorporated into the radio information.
>
> Information on nodes with internal antennas will be in good shape by the time the nightly build is released. But information on external antennas is solicited, especially less common ones (i.e., not Ubiquiti or Mikrotik).
>
> If you have some other brand of external antenna, submit it to the GitHub ticket. If you don't have an account there, now's the time to create one! And by having one you can get the hot scoop on what's coming down the pike for AREDN! :-)
>
> It goes here: https://github.com/aredn/aredn/pull/979
>
> And the format for external antennas is like this:
>
> {
>
> "model": "AM-9M13-120",
>
> "description": "airMAX 900 MHz, 13 dBi, 120° Sector",
>
> "gain": 13,
>
> "beamwidth": 120
>
> }
>
> I'll be putting my Altelix sector in there soon :-)

This is an interesting development and another great example of how the AREDN developers are making outdoor microwave networking more usable to Amateur Radio Operators (who are amateur microwave installers rather than professional microwave installers with access to professional modeling tools to build microwave networks). I'll guess that the end goal of this is AREDN node listings will be able to provide more accurate coverage predictions, with these additional parameters of antenna gain, beamwidth, and probably, tilt angle in addition to altitude, heading and transmit power.

Cornell University Conducting Ongoing Realtime HF Propagation Studies

This research is apparently being conducted by David Hysell of Cornell University.

> This exhibit accompanies a request for modification of experimental class license associated with file no:0257-EX-CN-2020, callsign:WK2XZJ.
>
> The licensed stations are used in pursuit of a grant from the Air Force Office of Sponsored Research no. FA9550-23-1-0164. The purpose of this research is to study ionospheric radio wave propagation and its impacts on critical operational systems, including DoD and civilian systems. We require the use of a number of low-power beacon transmitters operating on the low HF bands. A number of beacon receivers support this research. Our unique HF transmitters employ PRN coding much like GPS signals, and the observable data include time-of-flight, Doppler shift, and amplitude for each of the possible ray paths. Measurements of signals from pre-existing stations and signal sources are unsuitable for the project. Data from our entire HF network allow us to specify the regional ionosphere completely and to observe and mitigate propagation problems associated with space weather. The reconstructions improve with the number of transmit and receive stations employed. The ionospheric specification method we use is computationally intensive and completely novel.
>
> An especially novel component of the research is the incorporation of the University of Alaska, Fairbanks, HAARP research facility in Gakona, Alaska, which can modify the ionosphere in prescribed ways. Our research is performed in cooperation with research efforts at HAARP.
>
> The modification we are requesting is the addition of a beacon transmitter in Homer, Alaska. The ray path from Homer to one of our receivers in Eagle Village passes directly over HAARP, and the measurements of the signal will permit quantitative studies of the effects of ionospheric irregularities on HF propagation.
>
> The existing license for WK2XZJ is due to expire next summer. At that time, we will seek renewal for the overall, modified license.

That kind of realtime, complete characterization of HF bands moment to moment is the holy grail of reliable use of HF.

Programmable POCSAG Pager

Tom Salzer KJ7T in The Random Wire Newsletter:

> In the realm of what-possible-use-could-it-provide, I ordered a POCSAG-compatible pager (POCSAG stands for Post Office Code Standardisation Advisory Group). Remember those? Way back when, your doctor undoubtedly had one on a belt or in a pocket. I want to join the DAPNETnetwork and be notified of certain events in my home computer network. I've got an MMDVM hotspot running Pi-Star and the POCSAG protocol is supported, so my fingers are crossed I can make something work.

Like legacy (Plain Old Telephone Service - POTS) telephone technology, paging technology still holds some fascination for me. I'd forgotten that MMDVM (and newer Kantronics TNCs)

can support POCSAG, so, as KJ7T suggests, you *can* do your own paging.

Seeking VARA Enthusiasts for Beta Testing of New RadioMail Companion

Georges Auberger WH6AZ on the radiomail mailing list2:

> Aloha VARA enthusiasts!
>
> I'm excited to introduce [varanny](https://github.com/islandmagic/varanny), a new companion to RadioMail that's designed to enhance your VARA experience on a headless computer.
>
> I'm looking for a few dedicated VARA users who'd like to help me test and refine this feature before its official launch.
>
> Here's a brief overview of what varanny brings to the table:
>
> **Service Announcement for Zeroconf:**
> varanny uses DNS Service Discovery to announce the VARA modem services, making it easier for clients to find an active VARA instance and automatically fetch the IP and command port configured for it. This is similar to how the mobilinkd gets discovered. No more clumsy IP/port configuration required in RadioMail.
>
> **Remote Management:**
> With varanny, RadioMail can remotely start and stop the VARA program. This is especially handy for headless applications when VARA FM and VARA HF share the same sound card interface. It also resolves the issue of VARA failing to rebind its ports after a connection closes when running on a *nix system via Wine.
>
> **Multiple VARA Configurations Management:**
> Since VARA doesn't provide command line configuration options, varanny steps in to handle multiple configurations for you. It switches the .ini configuration file that VARA reads, allowing for smooth configuration changes before each session and restoring default settings afterward.
>
> **Audio Level Monitor:**
> varanny enables RadioMail to show an audio level meter that reflects the audio level from the input sound card connected to the remote computer. This helps you set the radio volume at the optimal level.
>
> If you're interested in participating, you should:
>
> - Be comfortable reviewing and following the steps on [GitHub] (https://github.com/islandmagic/varanny)
> - Be able to run VARA or VARA FM on a Windows or Linux (x86_64 only for now) computer

- Be familiar with command line operations and editing configuration files
- Have basic understanding of TCP/IP networking concepts
- Have experience with telnet for troubleshooting

If you'd like to join the beta test on TestFlight, please reply *directly* to me.

I'm excited about this new addition and I'd love your help in making it the best it can be.

I continue to be impressed with RadioMail and other application software for Amateur Radio that is developed by folks that clearly have a background in usability. (Amateur Radio software is often highly usable, but a bit "utilitarian".)

This is pretty cool development and it's another "easy Amateur Radio communications from your couch using your tablet" capability. I thought this workaround for a common issue with VARA was interesting:

> It switches the .ini configuration file that VARA reads, allowing for smooth configuration changes before each session and restoring default settings afterward.

FOSDEM 2024 Call for Participation: Software Defined Radio & Amateur Radio Devroom

From RTL-SDR.com:

> FOSDEM (Free and Open Source Developer's Meeting) is a yearly conference that this year will take place in Brussels, Belgium on 3 - 4 February 2024. This conference will also feature a track on FOSS-powered radio, and there will be a combined Amateur Radio and SDR Devroom.
>
> FOSDEM have issued a call for participation and have noted that slots are still open, so please submit any proposals for talks now if you are interested in presenting.
>
> Topics discussed in the devroom include, but are not limited to:
>
> - SDR frameworks and the tools that make them useful
> - New SDR-based developments in ham radio modes
> - Cellular/telecom software
> - Amateur radio operator software tooling
> - Free / Open radio hardware
> - Wireless security research

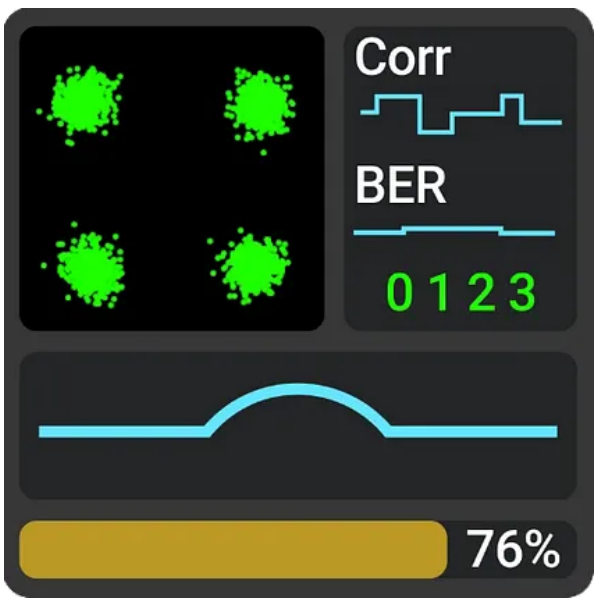
- Entertaining wireless hacks
- SDR & ham radio in mass and higher education
- Satellite, spacecraft and interplanetary communication

Software-Defined Radio is the technology of enabling radio signals to be processed and generated algorithmically, typically within general purpose processors, but also within FPGAs and GPUs; Free and Open Source (FOSS) Software Radio allows these algorithms to be inspectable and improvable. With the advent of ubiquitous IoT, sky-filling satellite megaconstellations and 5G/6G as standards designed with commercial Software Radios in mind, wireless is an exploding field of interest in the FOSS realm.

Ham Radio, also known as amateur radio, is more than just a hobby orbiting the usage of radio communication – it's a passion that merges the realms of electronics, human interaction, and communication. At its core, ham radio is about establishing connections: with people, with technology, and with the world at large. It is a free and open community effort at heart!

FOSDEM is one of those "ripe for exposure to the technically interesting aspects of Amateur Radio" conferences such as DEF CON.

SatDump Updates



SatDump icon - image courtesy of SatDump

My thanks to Amateur Radio Daily for the pointer to this.

There was an interesting article on the SatDump website - Projections - A Story.

> One of SatDump's major components is projections. Geo-referencing satellite data, especially when it's not in GEO requires quite a few convoluted processing steps.
>
> Considering one recent set of changes involved greatly improving the entire projection system's internals, I thought it would be a good idea to do a little article explaining the entire process in details, especially since this not something I have seen documented in any "simpler" way when I was doing research at the time.

I wasn't familiar with SatDump, so I looked at the About page:

> SatDump is a general purpose satellite data processing software. It is a one-stop-shop that provides all the necessary stages to get from the satellite transmission to actual products.
>
> Features:
>
> - Support of many SDRs such as RTL-SDR, Airspy, HackRF, BladeRF, LimeSDR, PlutoSDR, etc.
> - Recording of radio basebands from your SDR
> - Decoding and processing the data from over 90 different satellites and even space probes.
> - Live decoding of supported satellite links such as APT, LRPT, HRPT, LRIT, HRIT and many more.
> - Image and data decoding from satellites such as NOAA 15-18-19, Meteor-M, GOES, Elektro-L, Metop, FengYun, etc.
> - Calibrated and georefrenced L1b products output on select satellites, such as Sea Surface Temperature, Microphysics, etc. ready to use for scientific applications such as numerical weather forecasts.
> - Support for projecting the satellite imagery over a map, including layering with other instruments or satellites.
> - Inmarsat Aero and STD-C EGC messages decoding.
> - Scheduler and rotator control for automated satellite stations.
> - Ingestor for automated geostationary weather satellites reception.

Wow! *Mind*. ***Blown.*** There is *sooooo* much Zero Retries Interesting stuff out there.

Leave a comment

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Feedback Loop

My Thanks to Art - KC7SDA for the sole comment on Zero Retries 0125.

Join the *Fun* on Amateur Radio

If you're not yet licensed as an Amateur Radio Operator, and would like to join the fun by *literally having a license to experiment with radio technology*, check out **Join the Fun on Amateur Radio** for some pointers.

Zero Retries Frequently Asked Questions (FAQs) — In development 2023-02.

Closing the Channel

In its mission to highlight technological innovation in Amateur Radio, promote Amateur Radio to techies as a literal license to experiment with radio technology, and make Amateur Radio more relevant to society in the 2020s and beyond, Zero Retries is published via email and web, and is available to everyone at no cost. Zero Retries is proud *not to participate* in the Amateur Radio Publishing Industrial Complex, which hides Amateur Radio content behind paywalls.

My ongoing ***Thanks*** to:

- Tina Stroh KD7WSF for, well, *everything!*

- ***Founding Members*** **who generously support Zero Retries financially:**
  Founding Member 0000 - Steven Davidson K3FZT
  Founding Member 0001 - Prefers to Remain Anonymous 01

  Founding Member 0002 - Chris Osburn KD7DVD
  Founding Member 0003 - Don Rotolo N2IRZ
  Founding Member 0004 - William Arcand W1WRA
  Founding Member 0005 - Ben Kuhn KU0HN
  Founding Member 0006 - Todd Willey KQ4FID
  Founding Member 0007 - Merik Karman VK2MKZ
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- Numerous Annual and Monthly subscribers who also generously support Zero Retries financially!

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- One particularly effective method of promoting Zero Retries is to add a mention of Zero

Retries to your QRZ page (or other web presence) and include a link:

https://www.zeroretries.org

- If you'd like to financially support Zero Retries, becoming a paid subscriber is *greatly* appreciated and helps offset expenses incurred in publishing Zero Retries. Paid subscriptions for Zero Retries are *entirely optional*, as explained in this special issue of ZR:
  Zero Retries Administrivia - Activating Payment Options.

These blogs and newsletters regularly feature Zero Retries Interesting content:

- Dan Romanchik KB6NU mentions "Zero Retries Interesting" topics so regularly on his blog (that I otherwise wouldn't know about) that I've bestowed on him the honorific of Pseudostaffer.
- Jeff Davis KE9V also mentions "Zero Retries Interesting" topics so regularly on his blog (that I otherwise wouldn't know about) that I've bestowed on him the honorific of Pseudostaffer.
- Amateur Radio Weekly by Cale Mooth K4HCK is a weekly anthology of links to interesting Amateur Radio stories.
- Experimental Radio News by Bennet Z. Kobb AK4AV discusses (in detail) Experimental (Part 5) licenses issued by the US FCC. It's a *must-read-now* for me!
- RTL-SDR Blog - *Excellent* coverage of Software Defined Radio units.
- TAPR Packet Status Register has been published continuously since 1982.
- Other Substack Amateur Radio newsletters recommended by Zero Retries.

These YouTube channels regularly feature Zero Retries Interesting content:

- HB9BLA Wireless by Andreas Spiess HB9BLA
- KM6LYW Radio by Craig Lamparter KM6LYW (home of the DigiPi project)
- Modern Ham by Billy Penley KN4MKB
- Tech Minds by Matthew Miller M0DQW

Zero Retries is currently using the Substack email publishing platform to publish Zero Retries. It's particularly suitable for small newsletters as you can get started for no cost.

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Zero Retries (N8GNJ) is on Mastodon — n8gnj@mastodon.radio — just click:

Zero Retries / N8GNJ on Mastodon

Email issues of Zero Retries are "instrumented" by Substack to gather basic statistics about opens, clicking links, etc.

More bits from Steve Stroh N8GNJ:

- SuperPacket blog — *Discussing new generations of Amateur Radio Data Communications — beyond Packet Radio (a precursor to Zero Retries)*
- N8GNJ blog — *Amateur Radio Station N8GNJ and the mad science experiments at N8GNJ Labs — Bellingham, Washington, USA*

Thanks for reading!
Steve Stroh N8GNJ / WRPS598 (He / Him / His)
These bits were handcrafted (by a mere human, not an Artificial Intelligence bot) in beautiful Bellingham (The City of Subdued Excitement), Washington, USA, and linked to the Internet via **Starlink *Satellite* Internet Access**.

2023-11-24

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1

§97.113 Prohibited transmissions, (4) … messages encoded for the purpose of obscuring their meaning…

[2]

Minor reformatting for publication.